

DOE-OE FY14 Energy Storage Demonstration and Analysis Projects

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DOE –OE

Peer Review

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in the
national
interest*



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Energy Storage (ES) Demonstration & Analysis



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Presentation Outline

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 - Commissioning
 - Safety & Reliability

ES Demonstration and Analysis Team



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- Jaci Hernandez
- Ben Schenkman
- Summer Ferreira
- David Rosewater
- Victor Chavez
- David Schoenwald
- Todd Olinsky-Paul
- Georgianne Huff
- Garth Corey
- Abbas Akhil

ES Demonstration & Analysis Project Overview



Mission Statement:

Encourage investment in Energy Storage by insuring systems are:

- Safe
- Reliable
- Cost effective
- Functional
- Understood by the public

ES Demonstration & Analysis Project Overview



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Approach

- Work with National and International entities including DOD, State Energy offices, Utilities, ES Industry, Universities and Consumers to:
 - Provide **third party independent analysis and evaluation** for cells and systems
 - Support **grid-tied field demonstration** projects to monitor and analyze new and existing ES technologies in differing applications
 - Support State renewable/resiliency/ES initiatives
 - Develop public information programs

ES Demonstration & Analysis

Project Overview



Approach (continued)

■ **Third party independent analysis and evaluation**

1. Analyze and evaluate cells and systems for performance, safety and reliability
 - Innovative technologies – Aquion, Enervault, Primus, UET, Transpower, EPC, Altairnano, Ceramatec
 - Testing protocol and specification development
 - Technical readiness level evaluation
 - System operational performance and **optimization**
 - **Safety** analysis and evaluation

ES Demonstration & Analysis Project Overview



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Approach (continued)

■ **Grid Tied Field Demonstrations**

1. Analyze and evaluate systems

- Technical **consulting**, design support, **cost** and **optimization modeling**
 - Hawaiian Electric Company (HECO)
 - CEC ES 1.3 GW Initiative
 - University of California San Diego ES projects
- Support the development of testing **protocols** and procedures
 - Measuring and evaluating the Performance of Energy Storage Systems
- Develop **Commissioning** procedures and provide commissioning **support**
 - Primus Power, UniEnergy Technology, GS Battery
- **Monitor operational data, analyze, evaluate** and **disseminate** significant findings
 - DOD Base Camp Integration Lab

ES Demonstration & Analysis

Project Overview



Approach (continued)

■ **State initiatives and Public education**

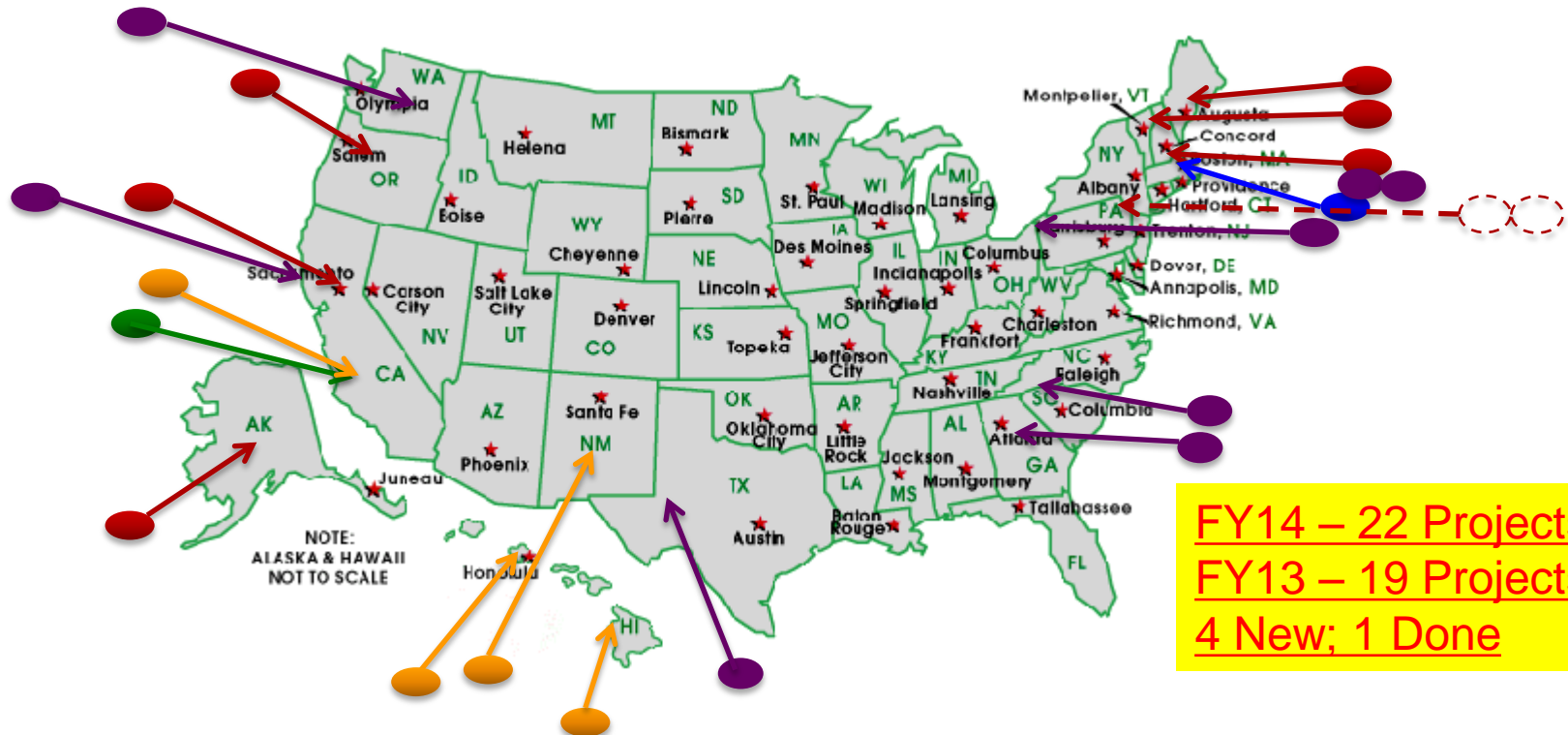
1. Through our Clean Energy States Alliance (CESA) partnership:
 - Provide Technical consulting to Various State Agencies
 - Connecticut DEEP; Innovate Massachusetts, New York, New Jersey, Burlington Vt. Airport
 - Develop projects, provide technical consulting and provide limited cost share to innovative technologies
 - Vermont and Oregon Department of Energy
 - Innovative technologies – Helix, Enervault, SustainX, Aquion
2. Partner with the ES industry, Academia, Consumers and others to provide education and act as ES information **clearinghouse**:
 - Energy Storage Guide
 - Various Sand Reports
 - Conduct ES related webinars

Map of DOE-OE EES Projects 2014



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Legend:



State -6 (4)



DOD-1 (2)



Academia-1 (2)



Commercial End User- 4 (2)



Industry-8 (7)



New or Proposed-2 (2)

Summary of EES Projects

FIELD DEMONSTRATIONS

<u>Location</u>	<u>Name</u>	<u>Technology</u>	<u>Environment/Application</u>	<u>Principal Investigators</u>
Massachusetts	Fort Devens Base Camp Integration Lab (BCIL)	30-75kW 0.5-1hr Lead Acid	Military Nanogrid – Forward Operating Base	Ben Schenkman David Rose
California	SunPower ES Installation	125kW 4hr Zinc Bromide	Commercial PV energy shifting Microgrid support	Matt Galland Ben Schenkman
California	University of California San Diego (UCSD) Energy Storage Initiative	2.5 MW 2hr	University campus microgrid with renewables	Ben Schenkman Bill Torre
Hawaii	NELHA	Aqueous sodium	PV support	Dan Borneo

Summary of EES Projects



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STATE INITIATIVES

<u>Location</u>	<u>Name</u>	<u>Technology</u>	<u>Environment/Application</u>	<u>Principal Investigator</u>
Vermont	Green Mountain Power	4MW with 1MWh Li-ion, and 2.4MWh LA	Utility/renewables	Jaci Hernandez
Alaska	Kodiak	Energy Storage	Utility/Grid	Ben Schenkman
Connecticut	Connecticut Deep	Multiple	Microgrid resiliency	Dan Borneo
Massachusetts	Clean Energy Center. Division of Energy Resources	various	DOER \$40M Grid Resiliency	TBD
New Jersey	Board of Public Utilities	TBD	\$10M ES for critical infrastructure \$200M NG Energy Resilient Bank	Dan Borneo
Oregon	Oregon Dept. of Energy	TBD	Utility resiliency and upgrade deferral	Dan Borneo
Washington	Puget Sound Energy	1 MW 2 hr Zinc Bromine Flow battery	Utility grid Support	Ben Schenkman
California	CEC/CPUC		1.3 GW initiative	Ray Byrne
New York	NYSERDA	TBD	\$40M New York Prize - Grid Resiliency	TBD
New Mexico	NM Department of Energy,	TBD	Renewable integration	Dan Borneo

Summary of EES Projects



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OPTIMIZATION, TESTING AND INDUSTRY SUPPORT

<u>Location</u>	<u>Name</u>	<u>Technology/Set-up</u>	<u>Environment/Application</u>	<u>Principal Investigators</u>
South Carolina	Duke Rankin site	FIAMM Sodium Nickel Chloride	Utility	David Schoenwald
California	Enervault	Iron Chrome Flow	Renewable support	Dan Borneo
New Hampshire	SustainX	ICAES	Industrial manufacturing facility grid	Summer Ferreira
Pennsylvania	Aquion Energy	Aqueous Sodium	Industrial manufacturing facility microgrid	Summer Ferreira
Massachusetts	Helix	Flywheel	Frequency Response	Jaci Hernandez
Georgia	GS Yuasa	LA/Ruggedized ES mobile unit LI-ion Testing	Microgrid/Commercial Safety Testing	Ben Schenkman David Rose
Texas	Texas Tech	1 MW 1hr Li-ion	Grid/Stabilization and arbitrage	Ben Schenkman
Hawaii	Hawaiian Electric Company	60-200 MW ES	Utility Renewable Support	Dan Borneo Ray Byrne

An old farmer takes up fishing



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FY14 Accomplishments



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- Joined Puget Sound Energy team (PNNL and Primus) to develop Factory Acceptance test. Provided input to factory testing plan that was based on our learnings from other ES projects.
- Completed evaluation of Flow battery installation at UCSD
- Completed testing of ESS in a forward operating base application for DOD Base Camp Integration Lab (BCIL)
- Joined HECO team and provided technical review of 22 ES proposals to install 200MW of ES.
- Joined CEC team to assist in roadmap and ES system protocol development.
- Initiated an ES project with Oregon Energy
- Executed contracts with GMP for an ES Project
- Completed analysis of three ES systems at ESTP
- Completed testing of cells for four battery vendors
- Conducted 8 webinars with a total of 795 attendees.

NOTE:
Details in
various team
presentations

Energy Storage Demonstration & Analysis



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Path Forward

- **Provide support to Nation in the development, design, installation, commissioning,** and operation of ES systems:
 - Increase optimization modeling capabilities and support
 - Continue cell and system level analysis
 - Increase project operational analysis and evaluation support
 - Develop Commissioning documentation and Increase field Commissioning endeavours
 - Support the development of codes, standards, regulations, and safety roadmap
 - Initiate another ES project with a State energy department.
 - Increase exposure to the international community
 - Continue support of ongoing projects – CEC, HECO, VT, OR, etc.
 - Continue partnership efforts with the industry - Innovative technologies, DNV-GL, etc.
 - Continue ES education efforts and webinar series



For more information, visit the website at:
www.sandia.gov/batterytesting

The 2015 Winter Call for proposals Will open end of September.

Application Deadline: January 15, 2015.
Notifications will be sent out February 2015.

The 4th Proposal Call is for testing:
January 16, 2015 - July 15, 2015.

The database is always open for [FAST-Track Proposals](#).

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Advanced Energy Storage Device Testing
Reliable independent evaluation of energy storage solutions.



Acknowledgements

DOE's **Office of Electricity** and Dr. Imre Gyuk for the confidence in me and my team, and continuing funding Sandia and the Energy Storage Demonstration Project.



In Memory:



Sally Miksiewicz
East Penn CEO

One of the good
“guys”!!

“We won’t go commercial until we are sure the battery will do what we say its going to do, for as long as we say its going to do it.”

Quote from Sally when asked when the Ultrabattery was going to go commercial

Thank You

Questions?

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